Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PCEI 4301

Fifth Semester Examination – 2013

COMMUNICATION SYSTEM ENGINEERING

BRANCH : BIOMED, IEE, EIE, ICE, AEIE

QUESTION CODE : C-329

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

(a) What are the performance measures in an communication system.

(b) Draw the spectrum of DSB signal with carrier.

(c) State the time delay properties of fourier transform.

(d) An AM wave has a power content of 1800 W at its carrier frequency. What is the power content of each of the sidebands when the carrier is modulated 85% ?

(e) What is the modulation index of an FM signal having a carrier swing of 100 KHz when the modulation signal has frequency of 8 KHz.

(f) How PM signal can be generated from FM signal ?

(g) What is flat top sampling ? Write down its merits.

(h) Find the Niquist rate of sampling of the mixed signal given below :

$\sin(2000\,\pi t) + \cos(5000\,t)$

P.T.O.

(i) How many AM broadcast station can be accommodated in 100 kHz bandwidth if the highest frequency component in the baseband signal is 5 kHz ?

(j) What is aliasing effect ? How it is reduced ?

2. (a) What is the need of high frequency carrier in a Communication System ? 3

(b) With a block diagram explain Elements of an Electrical Communication System. 4

(c) What is a Communication Channel ? Explain its Characteristics. 3

3. (a) Obtain the Fourier transform of the function 5

$$x(t) = 5[u(t+3) + u(t+2) - u(t-2) - u(t-3)]$$

(b) Show that the coefficients of an exponential Fourier series of a periodic function are 5

(i) real if function is even

(ii) imaginary for odd function.

4. (a) A message signal $x(t) = 100 \sin 2000t$ frequency modulates a carrier signal $c(t) = 200 \cos (2\pi \times 10^8 t)$ with a modulation index of 5.

Find : 6

(i) Write down the expression for FM signal.

(ii) What is the peak frequency deviation ?

(iii) What is the average power of the modulated signal ?

(iv) What is bandwidth of the modulated signal ?

(b) What do you mean by angle modulation ? Explain the term instantaneous frequency in case of angle modulation. 4

5. (a) Derive the expression for single tone amplitude modulated wave. 4

(b) An audio signal described as $30 \sin e 5000 \pi t$ amplitude modulates a carrier which is described as $65 \sin e 500000 \pi t$.

Find : 6

(i) Draw the spectrum of amplitude modulated wave.

(ii) What is modulation index ?

(iii) Find the side band frequencies.

(iv) What is transmission bandwidth of the AM wave ?

6. (a) What are the sources of error in PCM system ? Derive an expression of SNR in PCM system. What is its significance ? 5

(b) What is delta modulation ? How it differs from pulse code modulation ? 5

7. (a) In a binary PCM system, the output signal to quantization ratio is to be held to a minimum value of 40 dB. Determine the number of required level and find the corresponding output signal to quantization. 5

(b) With a neat diagram explain time division multiplexing. 5

8. Write short notes on any **two** : 5×2

(a) Companding

(b) Inter symbol interference

(c) Pulse time modulation

(d) Radio transmitter.